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## Atlantic Canada and Ocean Technology

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Canadians living in the Provinces of Newfoundland and Labrador, Nova Scotia, Prince Edward Island, and New Brunswick have long earned their prosperity from the sea. For centuries, the region has bred professionals, both in the fishery and marine transportation and shipbuilding. Atlantic entrepreneurs, backed by one of the largest concentrations of ocean researchers in North America, are now providing unmatched products and services in such diverse areas as marine biotechnology, survival systems, ocean mapping, and satellite remote sensing.

In the last decade, a vibrant community of companies, specializing in the "ocean high technology" sector has emerged and taken its place on the World's stage. Scientific research and development, however, is not new to the region. The emerging ocean technology companies are working successfully with universities and government research laboratories which have a long history and a well-deserved reputation in the ocean community. Fisheries research in St. Andrews, New Brunswick, and defense and oceanographic research in Halifax trace their beginnings to the first half of the century. Since the Second World War, an active community has grown up around Memorial University and government laboratories in St. John's, Newfoundland.

The growth in the region's ocean technology industries has been astounding. They have originated as spin-offs from universities, branches of larger corporations and as entrepreneurial start-ups. Over three hundred companies, with employee numbers ranging from only a few to over 1000, are now active in ocean technology. They export goods and services to every continent in the world, including the harsh environment of Antarctica, and their equipment is involved in activities from outer space to the deepest ocean depths. Atlantic Canada is truly a centre for an ocean high technology industry.

### A Remarkable Spectrum

Within Atlantic Canada, one can find scientific and engineering expertise in a surprising range of capability: ocean mapping and charting (including instruments), data base development, data management and dissemination, electronic charts, geophysical surveys, deep diving and training, and product management. Instrument development includes fibre optic-based particle counters and oil-in-water sensors. Acoustic technology includes software modelling and marine mammal and fish tracking; biotechnology has spun off a number of food and pharmaceutical products and some of the most modern naval vessels, including their integrated electronic systems, have been designed and built in Atlantic Canada. Integrated ocean surveillance systems are now designed and installed by local companies. The software industry is well represented in all of these pursuits as well as in specialized software development companies.

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To highlight many of the features of the region's technology:

**Ocean Mapping and Charting.** The Canadian Hydrographic Services has been charting Canadian waters since the turn of the century. In the past few years, this service has encouraged partnerships with Canadian industry. One of these, the Ocean Mapping Initiative for Canada, led by Software Kinetics Limited of Dartmouth, Nova Scotia, resulted in the preparation of long-term ocean mapping and technology development strategies. Member companies in the initiative such as Brooke Ocean Technology of Dartmouth, are suppliers of advanced over-the-side handling gear, and Universal Systems Limited of Fredericton in co-operation with the University of New Brunswick, have established solid international reputations in ocean data management (the CARIS system). They have all developed export business through a worldwide distribution network. Distribution and sale of electronic chart data is carried out by Nautical Data International Ltd. of St. John's, Newfoundland. Interactive Visualization Systems of Fredericton supply 3-D data handling and visualization software. In co-operation with regional companies, the Geological Survey of Canada - Atlantic, part of the Bedford Institute, provides expertise in marine geophysical mapping.

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**Cold Water Engineering.** In response to the offshore energy activity taking place in the adjacent harsh winter waters, St. John's, Newfoundland, has developed a partnership of government, university, and private companies providing products and techniques tested in the challenging extreme cold water environment. The Institute of Marine Dynamics, with its world-class ice tank, wave tank, and 200-meter towing tank has taken a lead in the design of structures for operation in these hostile conditions, which include pack ice and berg-infested waters. Companies such as CORETEC have developed pack ice drift prediction systems to augment operational safety. The Centre for Cold Ocean Engineering and Research works with a number of Newfoundland companies to provide a source of engineering expertise and experience.

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**Remote Sensing.** In October of 1995, the Canadian Space Agency launched RADARSAT, a remote sensing platform ideally suited for gathering data from the ocean surface. Well before this time, the Alliance for Marine Remote Sensing, located in Bedford, Nova Scotia, was formed by corporate and government members to accelerate the commercial applications of satellite-derived ocean data. Exporting companies include Hyperspectral Data International Inc., of Dartmouth, who conduct airborne spectrographic image surveys with clients in South America and the Caribbean, and Satlantic Ltd. in co-operation with IOSAT of Halifax, who produce a portable earth station. Assisted by the gathering level of expertise in the region, Compusult Ltd., of St. John's has developed the Integrated Data Access System (CIDAS). Environmental data from a number of sources, including Synthetic Aperture Radar derived ice data, will be distributed via the Internet.

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**Defense.** The Saint John Shipbuilding and Drydock Company, of Saint John New Brunswick, is in the final stages of a major shipbuilding program for the Canadian Navy. The Canadian Patrol Frigate has attracted the admiration of major navies around the world. The ships are designed and built in Atlantic Canada, and major software support and training facilities have been established locally to provide for life cycle maintenance. Companies such as Eduplus Ltd. in Halifax, provide custom computer-aided training packages for the ship's operators. Hermes Electronics in Dartmouth is a leading supplier of sonobuoys and acoustic devices to many navies. A vigorous software industry provides support to the Navy's activities. The Marine Institute in St. John's has provided equipment and personnel for the extensive sea testing of naval vessel performance. Ship repair and building yards in Halifax and Saint John can provide comprehensive overhaul and maintenance facilities for surface vessels and submarines. New surveillance techniques, such as over-the-horizon radar, are being developed and deployed by Raytheon Canada Ltd., of St. John's.

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**Underwater Acoustics.** The strong presence of the Navy on the Atlantic coast has engendered expertise in underwater acoustics in the Navy's Defense Research Establishment Atlantic and in companies such as Vemco, who produce acoustic fish and mammal tracking devices; Seimac Research Limited who develop underwater acoustic modeling software, and IOTTEK Ltd., designers of digital signal processing hardware.

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**Instruments and Communications.** As one might expect, the demands of the large number of research institutes in the region, coupled with a large user community, has resulted in an active instrument development and manufacturing industry. Metocean of Halifax, is a major exporter of miniature, air launched, meteorological and oceanographic instruments. NorthStar Technical Inc. in St. John's produces "netmind," a net monitoring system designed for smaller vessels to assist in the elimination of overfishing or excessive by-catches. Focal Technologies Inc. is a world leader in the provision of underwater slip-rings, using both electrical and fibre optic passes. Focal slip rings are exported worldwide and have been used in many of the notable deep explorations, including the dives on the RMS Titanic. Focal, located in Dartmouth, also produces an optical plankton counter. Advances in marine communications have provided opportunity for Ultimateast Data Communications Inc. and NewEast Wireless Telecom, both in St. John's, and Seimac Limited in Halifax. The former two companies provide software and communication networking, including vessel tracking. Seimac specializes in marine data acquisition and the tracking of valuable cargoes, in both cases using ARGOS or low earth orbiting satellites (LEOS). Seimac is also the developer of SABER, an air launched oil-in-water sensor used to detect and identify polluting ships and other sources of oil pollution.

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**Biotechnology.** Marine biotechnology is a fast growing sector of the region's ocean technology expertise. The science is well founded in two major research facilities: the Marine Gene Probe Laboratory at Dalhousie University and the Institute of Marine Biosciences in Halifax. The former, augmented by the facilities of the Dalhousie University Aquatron, provides research into stock and population discrimination, identification and assessment and selective improvement of aquaculture breeds. Hologene Genetics Technologies, Ltd. of Armdale, Nova Scotia, provides commercial genetic research services for aquaculture and fisheries. The Institute of Marine Biosciences is a leading research facility in aquaculture and seafood safety, marine bioproducts, marine analytical chemistry and genomics/bioinformatics. Among the companies active in the application of these technologies are Acadian Seaplants Ltd. and Fisheries Resource Development Limited.

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**Survival.** Survival Systems, Ltd., of Halifax, has earned an enviable reputation in the provision of offshore survival training and is currently exporting its services to several countries in South East Asia. In St. John's, the Offshore Safety and Survival Centre of Memorial University provides a wide variety of training from fire fighting to the transport of hazardous material.

**Training.** Training facilities available in Atlantic Canada cover an impressive spectrum. Universities, community colleges, trade schools, institutes and private companies all provide training in some aspect of marine science, engineering, operations, and management. For instance, Universal Systems in Fredericton trains data management technicians from South East Asia; Nautical Data, electronic chart technology to clients in South America; the Coast Guard College in Cape Breton is training members of the Polish Coast Guard, and the Oceans Institute of Canada, in Halifax, provides courses in international ocean management. In St. John's, the Marine Institute operates a state-of-the-art navigation simulator for the training of bridge officers.

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#### Industry, Government, University Co-operation

One of the most exciting and encouraging aspects of the development of the region's new strength in ocean industries is the extent to which the private sector can now count on the support and partnership of the research establishments. At Memorial University, their Institute of Fisheries and Marine Technology, including its Fisheries Technology Unit, the Centre for Cold Ocean Engineering and Research, and the Canadian Centre for Marine Communications all work in harmony, often in joint ventures, with the private sector. Halifax's Dalhousie University has initiated an Ocean Studies Program to bring together all of the concerned disciplines, including business, in a comprehensive whole. The Technical University of Nova Scotia operates the Centre for Marine Vessel Design and Research and the Centre for Fisheries Technology. Both work on problems posed by equipment suppliers or end users—the mariner or fish processor. Acadia University is active in coastal zone ecology, and the University of New Brunswick has fostered the development of the ocean mapping industry in that province.

Federal and Provincial laboratories such as the Bedford Institute of Oceanography, the North West Atlantic Fisheries Centre, The Institutes of Marine Dynamics and Marine Biosciences, The Nova Scotia Research Foundation, and the Defense Research Establishment Atlantic all co-operate with, encourage, and spin off private enterprises.

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*The preceding gives a brief glimpse of world-class activity in Atlantic Canada in the fields of ocean research and development and many commercial services, products, and companies. Detailed information can be obtained from the companies directly or from the following:*

In Newfoundland  
The Newfoundland Ocean Industries Association  
602-215 Water Street  
St. John's, Newfoundland  
A1C 6C9 Canada  
Tel: (709) 753-8123  
Fax: (709) 753-6010  
Internet: noia@public.compuserve.com

In Nova Scotia  
The Nova Scotia Oceans Initiative  
1 Research Drive  
Dartmouth, Nova Scotia  
B2Y 4M9 Canada  
Tel: (902) 463-6764  
Fax: (902) 466-6889  
Internet: nsoi@istar.ca

Additional information can be obtained from the nearest Canadian Trade Commissioner, from Industry Canada listed below, or from Industry Canada's World Wide Web site (<http://strategis.ic.gc.ca/>):

Industry Canada  
P.O. Box 940, Station M  
1801 Hollis Street  
Halifax, Nova Scotia  
B3J 2V9 Canada  
Tel: (902) 426-9905  
Fax: (902) 426-2624  
Internet: catruthers.connie@ic.gc.ca

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